

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

Patent Application No. 10/536,494

Confirmation No. 6551

Applicant: Hoffmann et al.

Filed: May 25, 2005

TC/AU: 1796

Examiner: Gregory Listvoyb

Docket No.: 235811 (Client Reference No. 059P 0579)

Customer No.: 23460

APPELLANTS' APPEAL BRIEF

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In support of the appeal from the final rejection dated August 8, 2007,
Appellants now submit their Brief.

Real Party In Interest

The patent application that is the subject of this appeal is assigned to EMS-Chemie AG, who is the real party in interest.

Related Appeals and Interferences

There are no appeals or interferences that are related to this appeal.

Status of Claims

The status of the claims is set forth in the Appendix attached hereto. Claims 1-18 are currently pending and are the subject of this appeal.

Status of Amendments

All amendments have been entered by the Office.

Summary of Claimed Subject Matter

Appealed claims 1-13 are directed to semi crystalline, melt processible, partially aromatic copolyamides, producible by condensation of at least the following monomers or precondensates thereof: a) terephthalic acid, b) at least one dimerised fatty acid with up to 44 carbon atoms, wherein the dimerised fatty acid has a trimerised fatty acid content of at most 3% by weight, and c) at least one aliphatic diamine of the formula $H_2N-(CH_2)_x-NH_2$, wherein x means a whole number from 4-18, with the proviso that when the partially aromatic copolyamide is produced by condensation of the monomers or precondensates a), b) and c) where x is 6, and further d) adipic acid, the melting point of the copolyamides is at least 265°C as measured by Differential Scanning Calorimetry (DSC) (see, for example, independent claim 1 and the specification at page 1, lines 18-24, page 3, lines 8-16, page 4, lines 7-9, page 5, lines 18-19, page 5, lines 24-29, and page 6, lines 1-3 (as amended on May 24, 2005)).

The semi crystalline, melt processible, partially aromatic copolyamides of the present invention exhibit increased toughness and can be produced according to methods known in the art (see, for example, the specification at page 2, line 26 - page 3, line 6).

Appealed claims 14-18 are directed to a method of preparing moulded articles comprising melt processing semi crystalline, melt processible, partially aromatic copolyamides, producible by condensation of at least the following monomers or precondensates thereof: a) terephthalic acid, b) at least one dimerised fatty acid with up to 44 carbon atoms, wherein the dimerised fatty acid has a trimerised fatty acid content of at most 3% by weight, and c) at least one aliphatic diamine of the formula $H_2N-(CH_2)_x-NH_2$, wherein x means a whole number from 4-18, with the proviso that when the partially aromatic copolyamide is produced by condensation of the monomers or precondensates a), b) and c) where x is 6, and further d) adipic acid, the melting point of the copolyamides is at least 265°C as measured by Differential Scanning Calorimetry (DSC) (see, for example, independent claim 14 and the specification at page 1, lines 18-24, page 3, lines 8-16, page 4, lines 7-9, page 5, lines 18-19, page 5, lines 24-29, page 6, lines 1-3 (as amended on May 24, 2005) and page 10, lines 15-16).

Grounds of Rejection to be Reviewed on Appeal

- Whether claims 1-5, 7, 9, and 11-18 are unpatentable under 35 U.S.C. § 103(a) in view of U.S. Patent 6,291,633 (Nakamura) in combination with U.S. Patent

5,786,086 (Frihart et al.) and U.S. Patent Application Publication 2003/0126788 (Uang et al.).

- Whether claims 6, 8, and 10 are unpatentable under 35 U.S.C. § 103(a) in view of Nakamura in combination with Frihart et al. and U.S. Patents 4,680,379 (Coquard 1) or 4,826,951 (Coquard 2) or Japanese Publication 05-125184 (Drawert).

Argument

A. Obviousness Rejection of Claims 1-5, 7, 9, and 11-18 Over Combination of Nakamura, Frihart et al., and Uang et al.

Nakamura allegedly discloses copolyamides prepared from terephthalic acid, C₆₋₁₂ aminocarboxylic acids or lactams, C₆₋₁₂ dicarboxylic acids, and C₄₋₁₂ diamines. Nakamura also allegedly discloses preparing molded articles from the copolyamide by extrusion and injection molding methods. The Office concedes that Nakamura does not disclose that the copolyamide comprises dimerised fatty acid. Frihart et al. reportedly discloses copolyamides prepared from terephthalic acid, adipic acid, and C₃₆ dimerised fatty acid with a trimer content of 1-35 wt% of tribasic or higher polymeric acid (col. 5, lines 31-40).

The Office Action asserts that Uang et al. provides evidence that the mechanical properties (e.g., low crystallinity, increased solubility) of dimerised fatty acid-based polyamide is affected by the nature of the acid. According to the Office, one of ordinary skill in the art would have been motivated by the disclosure of Uang et al. to use the dimerised fatty acid of Frihart et al. in the copolyamide of Nakamura with the expected benefit of a more regular structure and increased toughness.

In the comments section of the Advisory Action issued November 23, 2007, the Office states in item (1), “Uesaka [is] cited in the Office Action solely for evidence purposes. It shows an advantage of usinng [sic] Fatty Acids in Polyamides, i.e., lower crystallinity, which leads to a better mechanical properties [sic] (i.e., flexibility) and processabilirly [sic] of the polymer.” Appellants could not find a citation to a Uesaka reference in any of the previously issued Office Actions. Clarification of this point is requested.

The Office has failed to present a *prima facie* case of obviousness. More specifically, the Office has failed to set forth the information required in a proper obviousness determination (i.e., “a *Graham* factor analysis”). While the Office has apparently set forth

the scope and content of the prior art (the first factor), the Office Action does not recite the differences between the claimed invention and the prior art (the second factor). For example, it is not clearly acknowledged in the Office Action that Uang et al. and Frihart et al. do not disclose all of the elements of the present invention.

The Office uses Uang et al.'s disclosure that a polyamide comprising a dimerised fatty acid had lower crystallinity compared to a nylon-6,6 as motivation for combining the components of Nakamura and Frihart et al. However, the Office ignores the fact that Uang et al. describes a different category of polyamide than that of the present invention. The polyamide of the appealed claims is derived from at least three compounds, namely (a) terephthalic acid, (b) a dimerised fatty acid, and (c) a diamine, resulting at least in a terpolyamide, which is chemically different than the polyamide described by Uang et al. Uang et al. refers to polyamides being synthesized from (1) diamines and (2) "relatively high molecular weight polybasic acids or esters, including dibasic acids." However, these "dibasic acids" are obtained from thermal polymerization of a diene acid, i.e., an unsaturated fatty acid, such as linoleic acid. Neither terephthalic acid nor dimerised fatty acid is considered as a "relatively high molecular weight polybasic acid," as required by Uang et al. (paragraph [0044]). Thus in this reference, a diamine is reacted with an unsaturated fatty acid—and *not* a dimerised fatty acid, as required by the appealed claims—to form the substance referred to as a "polyamide" as described by Uang et al. As a result, the polyamide of the present invention structurally differs from the polyamide of Uang et al.

The differences between the polyamides of the present invention and Uang et al. are even more apparent when one considers that the appealed claims recite a lower limit of a melting point that is significantly higher than the polyamide described by Uang et al. The compounds disclosed by Uang et al. are poured into a mold at temperatures below 100 °C, which is indicative of the low melting point of these polyamides. In the instant application, the inventive copolyamide comprises a dimerised fatty acid, but the melting point is not lowered or mechanical properties negatively impacted.

The Office also fails to point out that Frihart et al. describes a functionalized polyamide that is different than both the present invention and Uang et al. Specifically, Frihart et al. describes an acrylate-modified aminoamide resin, which contains at least one acrylate or methacrylate group. In addition, the acrylate-modified aminoamides described by Frihart et al. exhibit lower melting points than the polyamide of the present invention, as

defined by the appealed claims (see, e.g., col. 5, lines 18-23 of Frihart et al.). Although the acrylate-modified aminoamide resin is formed from a polyamide, the Office has not set forth why one of ordinary skill in the art would knowingly combine the polyamide resin *precursor* of Frihart et al. with the copolyamide of Nakamura et al. rather than further functionalize the resin, as directed by Frihart et al.

With respect to the *Graham* factors, the Office also fails to define the level of ordinary skill in the pertinent art (the third factor) and fails to provide an appropriate explanation of *why* the consideration of the *Graham* factors results in the Office's conclusion that the claimed invention would have been obvious to one of ordinary skill in the art in view of the cited references. In particular, the Office has not properly set forth *why* one of ordinary skill in the art would know to use the dimerised fatty acid of Frihart et al. in the copolyamide of Nakamura with the expected benefit of a more regular structure and increased toughness. The Office's reliance on Uang et al. for its alleged teachings regarding the effect of dimerised fatty acid in a polyamide lacks support.

Uang et al. allegedly discloses that the "mechanical properties of dimerised fatty acid-based polyamide is greatly affected be [sic – by] the nature of the acid (i.e., ratio between monomeric, dimeric, trimeric and polymeric fractions (see line 0044))" (Office Action issued August 8, 2007, page 3, second paragraph). Appellants assume that the Office's citation of line 0044 of Uang et al. refers to paragraph [0044]. Appellants reviewed Uang et al., including paragraph [0044], and did not find the alleged disclosure "(i.e., ratio between monomeric, dimeric, trimeric and polymeric fractions (see line 0044))." It is requested that the Office show specific support for this statement.

In addition, Uang et al. reportedly discloses that the polyamides described therein have a lower degree of crystallinity compared to nylon-6,6. The Office Action states that "this phenomena occurs due to the molecular weight difference between adipic acid and dimerised fatty acids (C6 vs C18) and molecular weight distribution of commercial fatty acids" (Office Action issued August 8, 2007, page 3, second paragraph). Contrary to the assertion of the Office Action, Uang et al. simply states that "these polyamide have greater solubility in selected solvents and lower crystallinity than simpler nylons such as, for example, nylon-6,6 or nylon-6" (paragraph [0044]). Uang et al. does *not* attribute the greater solubility in selected solvents or lower crystallinity than simpler nylons to any particular factor, let alone the molecular weight difference between adipic acid and dimerised fatty

acids (C6 vs C18) and/or molecular weight distribution of commercial fatty acids. Therefore, this assertion by the Office is without basis. Appellants respectfully request that the Office cite specific support for the allegation or withdraw the statement.

The Office Action further states “large fragments of Tribasic fatty acid (C54) decreases [the] melting point of a polyamide, creates irregularities in crystallic [sic] structure and eventually decreases such mechanical propertie[s] as toughness (Young Modulus)” (Office Action issued August 8, 2007, page 3, third paragraph). The Office does not cite any support for this statement. Appellants could not find such disclosure in any of the cited references, including Uang et al. Appellants respectfully request that the Office cite specific support for this allegation or withdraw the statement.

In order to establish a *prima facie* case of obviousness with respect to a claim, at least two criteria must be met: (i) the prior art references must suggest to one of ordinary skill in the art to make the subject matter defined by the claims in issue and (ii) the prior art references must provide one of ordinary skill in the art with a reasonable expectation of success in so making the subject matter defined by the claims in issue. Both the suggestion and the reasonable expectation of success must be found in the prior art references, not in the disclosure of the patent application in issue. See, e.g., *In re Vaeck*, 947 F.2d 488, 493, 20 U.S.P.Q.2d 1438, 1442 (Fed. Cir. 1991). Since the Office’s reliance on Uang et al. is flawed and other statements set forth in the Office Action lack a source, the Office has failed to establish a *prima facie* case of obviousness.

Moreover, with respect to (ii), the Office also has failed to acknowledge that Uang et al. and Frihart et al. describe differing effects of dimerised fatty acid. To this end, neither of the effects described by Uang et al. or Frihart et al. are observed in the polyamide defined by the appealed claims.

In the present invention, copolyamides with dimerised fatty acids *increased* toughness. The incorporation of fatty acids in the polyamides described by Uang et al. provides a polyamide with a low crystallinity, and therefore, low rigidity (i.e., *decreased* toughness). The resulting polyamide of Uang et al. is useful for soft materials, such as candles (paragraph [0007]). Thus, upon reading Uang et al., one of ordinary skill in the art would be led away from using fatty acids for the production of polyamides with *increased* toughness since Uang et al. teaches preparing polyamides with low rigidity (i.e., *decreased* toughness). Given the structural differences between the polyamide of the present invention

and that of Uang et al. discussed above, Uang et al.'s observations of dimerised fatty acids are not applicable to the polyamide of the appealed claims. In other words, it cannot be said that one of ordinary skill in the art would appreciate any benefits or have an expectation of success from using a fatty acid as a component of a polyamide based on Uang et al., since Uang et al. is directed to a structurally different polyamide.

According to Frihart et al., the dimeric fatty acids provide improvement in the polyamide's color and oxidative stability (col. 5, lines 47-49). Frihart et al. does not disclose the effects described by Uang et al., namely the fatty acids' influence on the mechanical properties of the polyamide. Enhancement of toughness or rigidity is not mentioned in the disclosure of Frihart et al.

Thus, based on the foregoing, one of ordinary skill in the art would *not* be motivated to combine the teachings of Nakamura, Frihart et al., and Uang et al. as alleged by the Office because of (1) the difference in types of polyamides disclosed between the present invention, Frihart et al., and Uang et al., and (2) the difference between the present invention, Frihart et al., and Uang et al. in the observed benefits of incorporating a dimerised fatty acid. Even if, for the sake of argument, one overlooked the fact that Nakamura, Frihart et al., and Uang et al. are directed to different types of polyamides from one another, since Frihart et al. and Uang et al. teach differing benefits from the fatty acids, one of ordinary skill in the art would not have an expectation of success, given the disparity of teachings. The different effects that the fatty acids confer to the resulting polyamide in Frihart et al. and Uang et al. clearly demonstrate that the incorporation of dimeric fatty acids into polyamides has differing impacts that are strongly dependent on the nature of the polyamide and its components. This points to the unobviousness of the copolyamide of the appealed claims. The Office's position with respect to Uang et al. and Frihart et al. appears to be premised on hindsight knowledge of the present invention – an approach which is not proper. See, e.g., *Interconnect Planning Corp. v. Feil*, 774 F.2d 1132, 227 U.S.P.Q. 543 (Fed. Cir. 1985) (“It is error to reconstruct the patentee's claimed invention from the prior art by using the patentee's claim as a ‘blueprint.’”).

In view of the foregoing, the Office has not met its burden to establish a *prima facie* case of obviousness. Accordingly, Appellants submit that the present invention, as defined by the appealed claims, is not obvious in view of the combination of Nakamura, Frihart et al., and Uang et al.

B. *Obviousness Rejection of Claims 6, 8, and 10 Over Combination of Nakamura, Frihart et al., and Coquard 1 or Coquard 2 or Drawert*

The Office takes the position that, in addition to the disclosures of Nakamura and Frihart et al. discussed above with respect to claims 1-5, 7, 9, and 11-18, Coquard 1, Coquard 2, and Drawert disclose a mixture of isophthalic and terephthalic acids in the polyamides described therein.

Claims 6, 8, and 10 are dependent on claim 1. As discussed above, independent claim 1 is not obvious based on the combination of Nakamura, Frihart et al., and Uang et al. In view of Frihart et al. and Uang et al., one of ordinary skill in the art would not be motivated to incorporate dimerised fatty acids into the polyamide of Nakamura, since Frihart et al. and Uang et al. demonstrate that the addition of fatty acids weaken the polyamide, thereby resulting in polyamide compositions with lower toughness. Coquard 1, Coquard 2, and Drawert do not remedy this teaching away by Frihart et al. and Uang et al. Specifically, neither Coquard 1, Coquard 2, nor Drawert teach or suggest adding dimerised fatty acids to increase toughness of a polyamide composition.

Therefore, since there is no motivation to combine the references in such a way to arrive at the present composition, the subject matter of claims 6, 8, and 10 is not obvious in view of the cited references.

Conclusion

For the foregoing reasons, Appellants respectfully request the reversal of the obviousness rejections of the subject patent application.

Respectfully submitted,


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Date: March 6, 2008

Claims Appendix

1. (Previously Presented) Semi crystalline, melt processible, partially aromatic copolyamides, producible by condensation of at least the following monomers or precondensates thereof:

- a) terephthalic acid
- b) at least one dimerised fatty acid with up to 44 carbon atoms, wherein the dimerised fatty acid has a trimerised fatty acid content of at most 3% by weight, and
- c) at least one aliphatic diamine of the formula $H_2N-(CH_2)_x-NH_2$, wherein x means a whole number from 4-18, with the proviso that when the partially aromatic copolyamide is produced by condensation of the monomers or precondensates a), b) and c) where X is 6, and further d) adipic acid, the melting point of the copolyamides is at least 265°C as measured by Differential Scanning Calorimetry (DSC).

2. (Previously Presented) Copolyamides according to claim 1, wherein the melting point of these copolyamides, measured by means of DSC (Differential Scanning Calorimetry), is at most 335°C.

3. (Previously Presented) Copolyamides according to claim 1, wherein a further aromatic dicarboxylic acid d) with 8-12 C atoms is present.

4. (Previously Presented) Copolyamides according to claim 1, wherein in addition an aliphatic dicarboxylic acid e) with 6-18 C atoms is present.

5. (Previously Presented) Copolyamides according to claim 1, wherein in addition a lactam and/or an aminocarboxylic acid with 6-12 C atoms, preferable ω -aminolauric acid, are present as further monomers f).

6. (Previously Presented) Copolyamides according to claim 1, wherein the aromatic dicarboxylic acid d) is isophthalic acid.

7. (Previously Presented) Copolyamides according to claim 1, wherein the aliphatic dicarboxylic acid e) is adipic acid.

8. (Previously Presented) Copolyamides according to claim 1, wherein in addition to the monomers a), b) and c) wherein $x = 6$, isophthalic acid d) is present and the melting point of these copolyamides, measured by means of DSC, is at least 290°C.

9. (Previously Presented) Copolyamides according to claim 1, wherein in addition to the monomers a), b) and c) wherein $x = 6$, adipic acid e) is present and the melting point of these copolymers, measured by means of DSC, is at least 270°C.

10. (Previously Presented) Copolyamides according to claim 1, wherein in addition to the monomers a), b) and c) wherein $x = 6$, isophthalic acid d) and adipic acid e) is present and the melting point of these copolyamides, measured by means of DSC, is at least 265°C.

11. (Previously Presented) Copolyamides according to claim 1, wherein in addition to the monomers a), b) and c) wherein $x = 6$, laurinlactam (f) or ω -aminododecanoic acid (f) is present and the melting point of these copolyamides, measured by means of DSC, is at least 255°C.

12. (Previously Presented) Copolyamides according to claim 1, wherein $x = 9, 10$ or 12.

13. (Previously Presented) Copolyamides according to claim 12, wherein in addition to the components a), b) and c), adipic acid (e) is present.

14. (Previously Presented) Method of preparing moulded articles comprising melt processing semi crystalline, melt processible, partially aromatic copolyamides, producible by condensation of at least the following monomers or precondensates thereof:

- a) terephthalic acid
- b) at least one dimerised fatty acid with up to 44 carbon atoms, wherein the dimerised fatty acid has a trimerised fatty acid content of at most 3% by weight, and
- c) at least one aliphatic diamine of the formula $H_2N-(CH_2)_x-NH_2$, wherein x means a whole number from 4-18, with the proviso that when the partially aromatic copolyamide is produced by condensation of the monomers or precondensates a), b) and c) where X is 6, and further d) adipic acid, the melting point of the copolyamides is at least 265°C as measured by Differential Scanning Calorimetry (DSC).

15. (Previously Presented) The method of claim 14, wherein the moulded articles are hard-soft combinations.

16. (Previously Presented) The method of claim 14, wherein the melt processing method is selected from extrusion, injection moulding, coextrusion, blow moulding, deep drawing, sequential coextrusion, sequential extrusion blow moulding, 3D blow moulding, coextrusion blow moulding, coextrusion 3D blow moulding and coextrusion suction blow moulding.

17. (Previously Presented) Moulded article produced to the method of claim 14.

18. (Previously Presented) Moulded article produced according to the method of claim 17, wherein it is a hard-soft combination.

Evidence Appendix

Not Applicable.

Related Proceedings Appendix

Not Applicable.